ACI News Letter

Vol. 25, No. 7 JOURNAL of the AMERICAN CONCRETE INSTITUTE March 1954

PREPAKT ANNOUNCES NEW *Mixed-in-Place* GROUTING TECHNIQUE FOR FOUNDATION STABILIZATION...

Here's a remarkable new construction technique!

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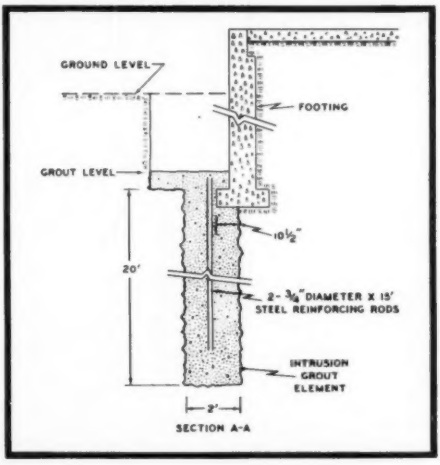
For further information on Prepakt's new *Mixed-in-Place Intrusion Grouting* technique, contact the Main Office, Room 779-L, Union Commerce Bldg., Cleveland.

BUILDING SETTLEMENT HALTED—Some 60 Mixed-in-Place Intrusion Grout piles were used for underpinning an Omaha warehouse being damaged by continued settlement. Photo (above) shows truck-mounted rig in action close to building. Use of 24" bit allowed 10½" of blade to work under spread footing for better support. Diagram (below) indicates that Prepakt method minimized excavation and eliminated casting of pile cap.



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ACI

News Letter Contents

March 1954

On the Cover—Reinforced concrete spiral staircase, New Johannesburg Railway Station, Union of South Africa. The stairway is 26 ft high and is constructed as a free standing spiral of 1¾ turns with a further ¼ turn built into the bottom anchor. Stair treads, 10 ft wide, are cantilevered from an inner spiral core 16 in. in diameter, the helix being 11 ft in internal diameter with a 16-ft pitch. Design was by A. S. Joffe and construction by South African Railways.—*Courtesy South African Railways and Concrete Assn. of South Africa*

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50th Annual Convention Draws Large Registration

Mile-high Denver was host to 786 ACI members and their wives and visitors at the 50th annual convention, February 22-26, at the Shirley-Savoy Hotel. The women's attendance broke all previous records with 165 ACI members' wives attending. This was due largely to the work of the local committee in providing entertainment and outings for the women.

A crowded technical program attracted large audiences at each session, and highlights of the program included the 50th Anniversary Dinner, the Awards Luncheon, a dinner dance, and a buffalo barbecue luncheon. As in Boston, in 1953, one full day was devoted to technical committee meetings and some committees held other meetings during the convention.

New officers elected were: Charles H. Scholer, president; Frank Kerekes, vice-president; Phil M. Ferguson, Joseph F. Jelley, H. C. Ross, and George W. Washa, directors.

Retiring Board members, I. E. Morris, Walter H. Price, and Frank H. Jackson received Certificates of Appreciation.

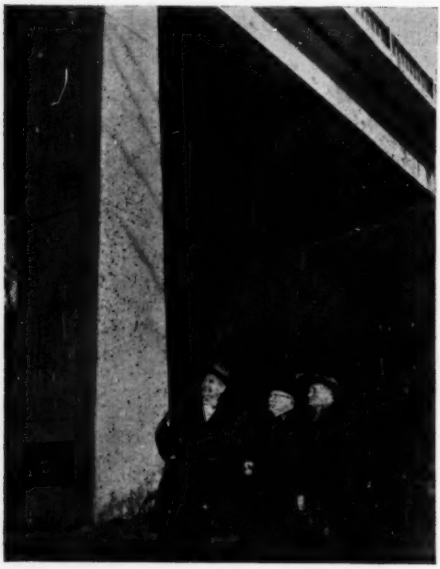
Institute awards were presented at the Awards Luncheon on Wednesday, February 24. The Wason Medal for the "most meritorious paper" of the year was presented to David Watstein; Phil M. Ferguson and J. Neils Thompson received the Wason Medal for "noteworthy research;" and the Construction Practice Award was presented to Alden M. Klein, and J. H. A. Crockett. Also at the luncheon, Honorary Membership was bestowed on Raymond E. Davis, past president of the Institute.

The complete convention story, including technical sessions, will be published in the April *News Letter*.

Positions and Projects — ACI Members

Frost elected vice-president

Turner Construction Co. has announced the election of T. Robert Frost as vice-president of the company's wholly-owned subsidiary, Canadian Turner Construction Co., Ltd. Mr. Frost has been with the company since 1934, and had served as purchasing agent in the Boston office from 1941 to July, 1953, when he was appointed office manager of the Toronto office of Canadian Turner.



Dr. Gustave Magnel (center), the Belgian civil engineer who developed the modern tools and techniques of prestressed concrete used in Philadelphia's Walnut Lane Bridge, visited the site to see the completed bridge for the first time on a recent visit to Philadelphia's Drexel Institute of Technology. Magnel last saw the bridge, when he was in the city as consultant, in the early stages of construction and at the time of testing of the main span.

With him on the visit were his former student at the University of Ghent, Charles C. Zollman (right), now professor of civil engineering at Drexel, in addition to being chief engineer, Vacuum Concrete Inc., who was coordinator of the building operation, and Samuel Baxter (left), city water commissioner, who was associated with the City Bureau of Engineering, Surveys, and Zoning at the time of the construction.

Lehigh University receives grants

Three grants totalling $24,200 for the support of research in engineering, chemistry, and mathematics at Lehigh University, Bethlehem, Pa., by the National Science Foundation, Washington, D. C., were announced recently. The engineering grant of $15,000 was made to permit expansion of a three-year study on the influence of residual strength on column strength being conducted in the civil engineering department of Lehigh University. This program, under the direction of Dr. Lynn S. Beedle, associate director of the Fritz Engineering Laboratory, was started in 1952 at Lehigh in cooperation with the Pennsylvania Department of Highways and the Column Research Council.

NSPE holds spring meeting

The spring meeting of the National Society of Professional Engineers was held recently in Albuquerque, N. M. Engineers discussed plans and policies for the months ahead, with full mobilization of society programs for continuing action on the general problem of engineers in industry constituting the main objective of the conference.

ASTM revises lightweight aggregate specifications

Committee C-9, American Society for Testing Materials, has found the existing "Standard Specifications for Lightweight Aggregates for Concrete (C 130)" to be out-of-date and has completed two of three proposed new tentative specifications to replace it. In these new specifications more specific treatment is given to the various types of lightweight aggregates and to specific types of concrete. "Tentative Specifications for Lightweight Aggregates for Concrete Masonry Units (C 331)" covers lightweight aggregates intended for use in concrete masonry units in which a prime consideration is lightness, and "Specifications for Lightweight Aggregates for Structural Concrete (C 330)" covers lightweight aggregates intended for use in structural concrete in which prime considerations are weight and compressive strength of the concrete.

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Indian reinforced concrete symposium

A symposium on "Reinforced Concrete in India Today" was held recently in Roorkee, India, under the auspices of the Council of Scientific and Industrial Research of India, and opened by Dr. S. S. Bhatnagar, Secretary to the Government of India with Dr. K. Billig, director of the Central Building Research Institute, presiding. The symposium was attended by delegates from all over India, among whom were representatives of public works departments, universities, research institutes, railways, concrete associations, and a number of private consultants and contractors. There were also delegates from Ceylon and Burma.

Materials, design, and construction were covered during the six business sessions. Under materials, papers dealt mainly with pozzolans, Indian standard sand, various treatments of concrete, twin-twisting of steel bars, steel for prestressed concrete, and bamboo reinforcement. Under design, the main items discussed were dams and power stations, and prestressed concrete. The last two sessions of the symposium were devoted to construction dealing with structures on railways, dams, and power stations and corrugated concrete shell roofs which are now being used for low-cost housing in India.

LOOKING AHEAD

May 3-14, 1954—British Industries Fair, Olympia and Earls Court, London; Castle Bromwich, Birmingham, England

June 14-18, 1954—62nd Annual Meeting, American Society for Engineering Education, University of Illinois, Urbana, Ill.

June 14-19, 1954—Atlantic City Convention, American Society of Civil Engineers, Chalfonte-Haddon Hall, Atlantic City, N. J.

July 11-21, 1954—Sixth Pan American Road Congress, American Road Builders' Assn., Pan American Division, in cooperation with the Venezuelan government and Western Hemisphere engineers, Caracas, Venezuela

New York building code

The New York State Building Code Commission's Executive Department has announced completion of the second portion of that state's building code entitled "State Building Construction Code Applicable to Multiple Dwellings," which augments the one- and two-family dwelling code previously promulgated. These two regulations, by 1953 construction records, cover 88 percent of construction projects; the remaining 12 percent, represented by nonresidential structures, will be covered by the third portion of the code now in preparation.

Shank to teach full time

Prof. J. R. Shank, assistant director, Ohio State University Engineering Experiment Station, Columbus, Ohio, since 1938, asked to be relieved as the administrative head of the station to devote full time to his professorship in the department of civil engineering.

Professor Shank has a long and distinguished career in the field of engineering teaching and research. He joined the Ohio State faculty in 1917, bringing industrial design experience in the steel, coal, and railroad industries to the college of engineering. During the ensuing years he held the rank of research professor, and, in 1938, was named as assistant director of the station and professor of structural engineering. He was honored in 1937 by ACI with the Wason Medal for his outstanding paper, "The Mechanics of the Plastic Flow of Concrete." Professor Shank holds a life membership in the American Society of Civil Engineers and memberships in the American Concrete Institute, American Ceramic Society, Ohio Academy of Science, Newcomen Society, and the National Society of Professional Engineers, as well as several service groups. A civil engineering graduate of Penn State College, he is a member of Tau Beta Pi, Sigma Xi, and Phi Kappa Phi.

Turner Co. awarded Detroit contract

Construction of River House, a 15-story, 448-unit apartment building in Detroit, Mich., has been let to Turner Construction Co., New York, N. Y.

Amendments to Proposed Standard Specification for the Design and Construction of Reinforced Concrete Chimneys

Committee 505 of the American Concrete Institute recommended the following revisions to "Proposed Standard Specification for the Design and Construction of Reinforced Concrete Chimneys," ACI JOURNAL, Jan. 1953, *Proc.* V. 49, p. 353, at the 50th annual convention held February 22-26, in Denver, Colo. The changes were accepted by convention vote and will be referred to ACI membership for letter ballot later this month.

In addition to the following changes, slight printing and editorial changes in the proposed standard were also acted on favorably.

Page 357 under Section 4 and subdivision 400—General:—add the following paragraphs:

(f) The minimum thickness of the concrete shell for any chimney with an internal diameter of 20 ft or less shall be 6 in. When the internal diameter exceeds 20 ft, the minimum thickness, in in., shall be determined from the following equation

$$t = 6 + \frac{d - 240}{120}$$

Where d = inside diameter of concrete chimney shell, in.

(g) The clear concrete cover over the reinforcement shall be not less than 2 in.

Page 360. For the footnotes at the bottom of the page substitute the following wording:

The research data available to establish the coefficients of heat transfer through chimney lining and shell, especially as they concern the heat transfer from gases to the surfaces and through ventilated air spaces between lining and shell, are somewhat meager. Unless complete heat balance studies are made for the particular chimney, it is permissible to use constants as determined or stated in the following. These constants when entered into the equations for temperature differential through the chimney shell, T_x, will give values of accuracy in keeping with the basic design assumptions.

$r_q = 0.5$ $C_c = 12$

C_a and C_b (To be obtained from the manufacturer of the materials used.)

K_1 (To be determined from curves in Fig. 17.)

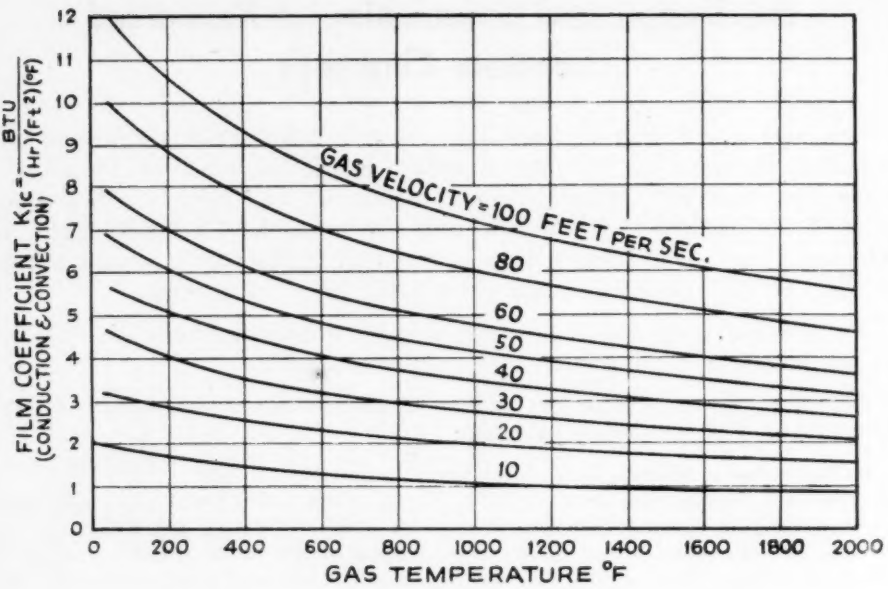
$K_2 = 12$ $K_r = \frac{T}{120}$ $K_s = \frac{T}{150}$

The value $r_q = 0.5$ shall apply only where the distance between the lining and the chimney shell is not less than 4 in. throughout the entire height of the lining and air inlet openings are provided through the chimney shell at the bottom of the lining having an area in square feet numerically equal to two-thirds the inside diameter in feet of the chimney shell at the top of the lining. Local obstructions in the air space between the lining and the chimney shell shall not restrict the area of the air space at any horizontal section to less than that specified for air inlet at the bottom of the lining.

Corbel supported full-height linings should be arranged to allow for expansion and to protect adequately the concrete of the corbel and the chimney shell against corrosion from chimney gases.

Where a self-supporting or corbel-supported partial-height lining is used, the height to which the lining is carried should be determined on the basis of the temperature stresses in the chimney shell and protection against corrosion of the concrete rather than on the basis that the temperature of the gas materially decreases as it passes up the chimney. Attention is called to a number of tests which have been made on chimneys in service (See "Report of Tests Made to Determine the Temperatures in Reinforced Concrete Chimneys," ACI *Proceedings*, V. 21, 1925, p. 204;

Continued on p. 9



FLUE GAS FILM COEFFICIENT

$$K_1 = K_{1C} + K_{1r}$$

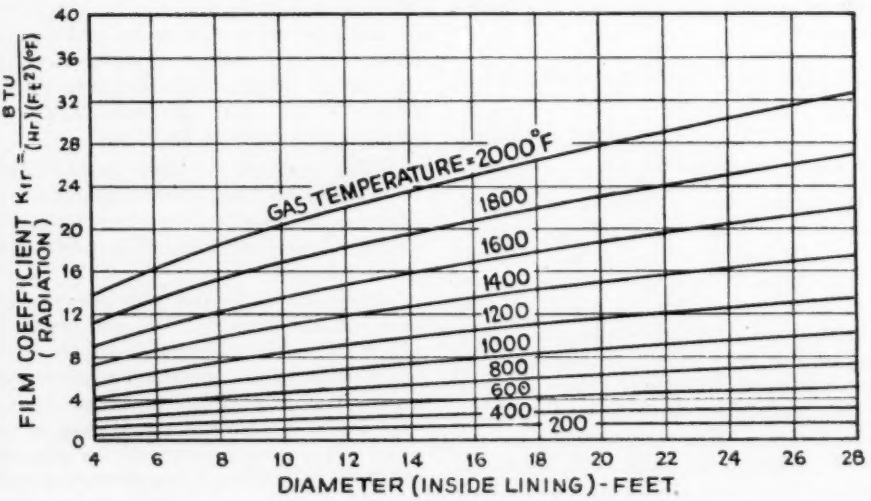


Fig. 17—Flue gas film coefficient

Chimney Standard

Continued from p. 7

"Outline of Tests on 300-ft Reinforced Concrete Chimney," ACI *Proceedings*, V. 22, 1926, p. 350; and "Report of Tests on 300-ft Reinforced Concrete Chimney," ACI *Proceedings*, V. 23, 1927, p. 109.) which show that the drop in temperature of the chimney gas between the entering point and the top of the chimney is relatively slight.

Page 361 under subdivision 407 add the following paragraph:

(b) Vertical reinforcement shall be not less than 0.25 percent of the concrete area at the section under consideration, and reinforcing bars shall be not less than ½ in. diameter and spaced not over 12 in. on centers.

Page 363 under subdivision 409 for the last paragraph following Eq. (48) substitute the following paragraph:

(c) Circumferential reinforcement shall be not less than 0.2 sq in. per ft of height and not less than 0.20 percent of the concrete area at the section under consideration and the reinforcement shall be spaced not further apart than the shell thickness, and in any event not more than 12 in. The minimum diameter of circumferential reinforcing bars shall be ⅜ in.

Page 385. For Fig. 17 substitute the following revised figure on facing page.

Canada builds new research laboratory

The first structure designed specifically for research on building was recently dedicated at the National Research Council in Ottawa, Ont., Canada. The building contains over 1,000,000 cu ft of working and office space, and is erected to serve the research needs of the construction industry in Canada. A building research conference was held in conjunction with the dedication at which Dr. F. M. Lea, director, British Building Research Station, described the work of that organization in his paper "Building Research in Great Britain." Mr. D. E. Parsons, chief, Division of Building Technology, National Bureau of Standards, Washington, D. C., delivered a paper on "Building Research in the United States," and "Building Research in Scandinavia" was described by Mr. N. V. Lindqvist, secretary, Swedish State Committee for Building Research. To complete the picture, Dr. N. B. Hutcheon, assistant director of the division outlined "Early Building Research in Canada."

Following the general session, two concurrent seminars were held—one on building science on moisture in solid materials and one on housing research. At the first housing research seminar, papers were given by the U. S. Building Research Advisory Board's executive director, William H. Scheick; Leonard G. Haeger, director of research, National Assn. of Home Builders; and Prof. J. T. Lendrum, director of the University of Illinois Small Homes Council.

Abeles lectures on prestressed concrete

P. W. Abeles, consulting engineer and lecturer on prestressed concrete for graduates at the Brixton School of Building, London, England, who lectured in this country in the autumn of 1952, is visiting the United States again, and during his visit attended the meeting of the Joint ACI-ASCE Committee 323, Prestressed Reinforced Concrete, on the occasion of ACI's 50th annual convention. He also presented a convention paper on fatigue tests of prestressed beams. Martin Mahler, architect-consultant, prestressed concrete, Union, N. J., who has been promoting the study of prestressed concrete at colleges and universities in America for some time, has again arranged for a number of lectures on prestressed concrete to be given by Dr. Abeles.

Lectures given by Dr. Abeles included those at the University of California, Kansas State College, Iowa State College, and Illinois Institute of Technology. The rest of the itinerary will include Georgia Institute of Technology, Atlanta, Ga., Mar. 22-23; Tennessee Agricultural and Industrial State University, Nashville, Tenn., Mar. 25-26; University of Tennessee, Knoxville, Tenn., Mar. 29; Lehigh University, Bethlehem, Pa., Mar. 31, Apr. 1; Ohio State, Columbus, Ohio, Apr. 5-6; Cornell University, Ithaca, N. Y., April 8-9; Tufts College, Medford, Mass., Apr. 12-13; and Northeastern University, Boston, Mass., April 14-15.

Field Testing of Concrete*

By SVEN THAULOW†

Methods and equipment used for testing and controlling concrete in the field must be simple, sturdy, and rapid. Although emphasis is placed on the final product being a concrete with the desired properties, little has been done to simplify equipment used for testing the mix in the field. To fill this need, the author proposes simplified methods and equipment for field control of concrete. Simplicity is stressed so that possible errors, resulting from faulty or inconsistent use of equipment, are minimized.

Testing equipment

For use in the field, the testing equipment includes:

1. A nest of 11-in. diameter sieves with aluminum-alloy frames in a portable container.

2. A small balance especially adapted for field use with about a 50-lb capacity (Fig. 1).

3. The concrete tester (Fig. 2). A 2.64-gal. (10-liter) container and a standard slump cone, both cast from a hardened aluminum alloy with the container graduated on the inside to read 1.32 gal. (5 liters). Accessory equipment for the concrete tester (Fig. 2) would include a 10-in. square plate of transparent plastic, a 24 x ⅝-in. stainless steel rod, and a shovel.

*Abstract of "Field Testing of Concrete," by Sven Thaulow. Published by Norsk Cementforening, Oslo, Norway, 1952.

†Member American Concrete Institute, Chief Construction Engineer, A/S Christiania Portland Cementfabrik, Slemmestad, Norway.

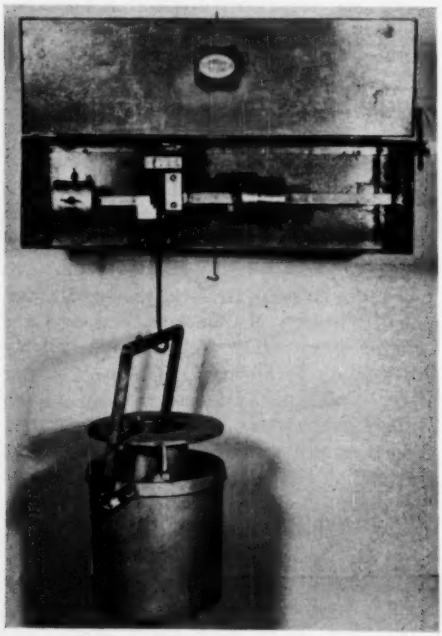


Fig. 1—Specially adapted 50-lb balance

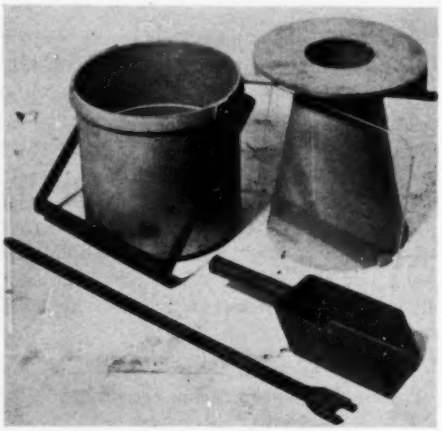


Fig. 2—Concrete tester

4. Drop table for the concrete tester (Fig. 3). The table is activated by a hand crank which drops the table four times, 0.394 in. each time, and records the revolutions on an automatic counter. A collar for filling the slump cone and cylinder mold comes with the unit with anchor bolts for clamping the apparatus.

5. Cylindrical steel molds provided with top and bottom plates, collars with a handle, and anchor bolts (Fig. 4). Standard 6 x 12-in. cylindrical molds are used, or if the maximum aggregate size is less than 1 to 1 3/16 in., a 4 x 8-in. mold may be used.

6. Compression testing machine of 100-ton capacity. The author used a Norwegian machine which weighed about 220 lb.

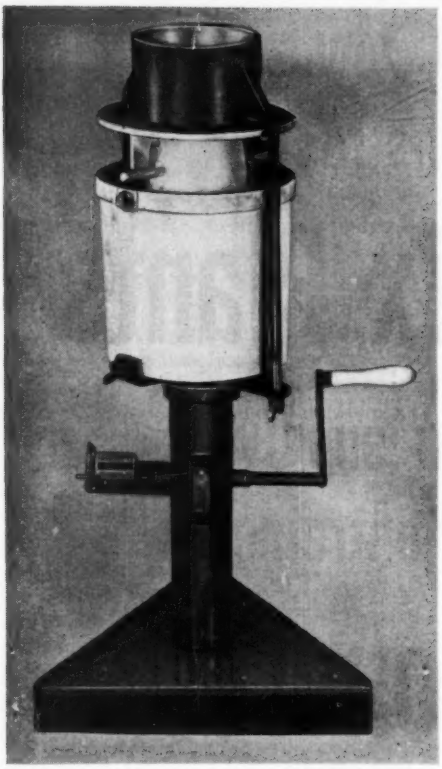


Fig. 3—Drop table with concrete tester

Testing of aggregates

In general, concrete control should begin at the source of supply. In the author's case, aggregate was obtained from three gravel pits around Oslo, Norway. Care was taken in sampling aggregates to obtain representative samples with top soil and other organic impurities removed. Samples obtained from the pits and deliveries from these pits showed small variations in specific gravity, particle shape, and moisture content, but noticeable variations were encountered in particle size and percentage of fines (less than 0.006 in.). In the main, however, these investigations showed that with intelligent operation of pits a uniform aggregate may be expected. It must be emphasized that the author's conclusions stem from three gravel pits of the same geological origin and that these conclusions may not hold true for other cases.

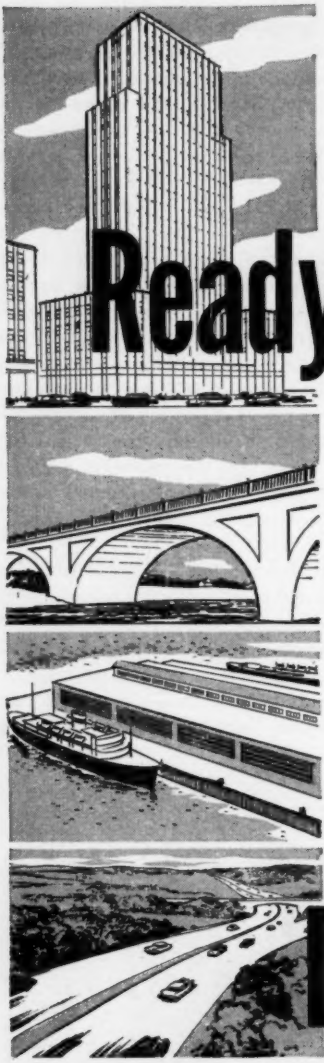
Physical properties such as unit weight, grain size distribution, specific gravity, and moisture content were obtained using the concrete tester, balance, and sieves in the following manner: For the wet unit weight, a representative sample was placed in the 2.64-gal. (10-liter) container and its weight obtained. For the dry unit weight the aggregate was placed in the concrete tester so that the material formed a crown and then it was compacted by allowing the handle to fall freely against the side of the container 80 times, on alternate sides, with about 1½ to 2 sec between blows. More material was added to the top after 40 blows to maintain the crown shape. Following compaction the top was leveled off and the unit weight determined. The use of this procedure allowed uniform compaction, and greater reproducibility of results than by other methods now in use.

Grain size distribution was obtained using the nest of lightweight sieves. A convenient method was to rock the nest of sieves for 5 min in the portable container, thereby inducing horizontal as well as vertical impulses.

Specific gravity and surface moisture were obtained rapidly and accurately by using

Continued on p. 24

Fig. 4—Cylindrical molds for compressive strength tests



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NSGA and NRMCA hold annual conventions

The 38th annual convention of the National Sand and Gravel Assn. and the 24th annual convention of the National Ready Mixed Concrete Assn. were held recently in Chicago. One of the outstanding features was the biennial show where displays by leading manufacturers of machinery, equipment, and supplies for the sand and gravel and ready-mixed concrete industries were presented.

Among the technical presentations included in the convention programs were the following: "Standardization of Ready-Mixed Concrete Equipment and Processes," by Robert W. Smith, chairman, Truck Mixer Manufacturers Bureau; "Investigation of Mixing Action of Truck Mixers," by Stanton Walker and Delmar L. Bloem, director and assistant director, respectively, National Ready Mixed Concrete Assn.; "Effect of Fly Ash in Concrete," also by Mr. Bloem; papers on the "Retention of Fines in Sand," by M. C. Evans, vice-president, Becker County Sand and Gravel Co., Cheraw, S. C., and Robert H. Klossner, operations manager, Witte Gravel Co., Kinder, La.; general discussion of "Production of Fines by Crushing and Grinding," with papers by Robert S. Barneyback, vice-president, Henry J. Kaiser Co., Oakland, Calif., and C. A. Williamson, plant superintendent, Perkins Gravel Co., Sacramento, Calif., "Removal of Deleterious Particles from Sand and Gravel," by L. P. Struble, vice-president, Dravo Corp., Pittsburgh, Pa.; "Considerations in Applying Heavy-Media Separation to Benefication," by R. W. Hernlund, sales promotion manager, Western Machinery Co., San Francisco, Calif.; and "Use of Belt Conveyors in the Sand and Gravel Industry," by R. U. Jackson, manager, Mine Conveyor Belts and Development, Robins Conveyor Division, Hewitt-Robins, Inc., Passaic, N. J.

Tooker enters private practice

Harry L. Tooker announced recently the formation of Tooker Engineering Co., consulting engineers, with offices in Houston, Texas. Mr. Tooker will head the firm which will specialize in architectural, civil, structural, and consulting engineering.

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Stirling Murray Rust

Stirling Murray Rust, chairman of the board and a founder of Rust Engineering Co., Pittsburgh, Pa., died recently. Mr. Rust received his education at public schools and at Woodberry Forest School and Kenmore School in Virginia before coming to Pittsburgh in 1898, where he began work as a laborer for C. G. Hussey & Co. He next worked as a blueprint boy with Jones & Laughlin Steel Co., and later with other steel companies in design, construction, and operation of steel plants in Pittsburgh, and other cities. In 1905 he joined with two brothers, Edmund Jennings Lee Rust and Ellsworth Marshall Rust, to form Rust Engineering Co., in Birmingham, Ala., and later in 1913, Mr. Rust established a branch of the company in Pittsburgh. In 1920 when the firm was incorporated with headquarters in Pittsburgh, Mr. Rust became president and served in that capacity until 1944, when he became chairman of the board.

Problems and Practices

Third of a series relating to "down-to-earth, everyday" concrete problems. This series, presented in question and answer form, attempts to give brief answers to the more common (and sometimes uncommon, too) questions asked about concrete design and construction practices.

To some, the answers will seem simple and obvious; others may prove to be extremely controversial.

All ACI members are invited to participate —either by submitting an inquiry, or even better, by telling JOURNAL *readers how an intriguing problem was solved. It may well be that readers will be able to suggest more practical solutions to inquiries than those presented.*

* * * *

This month's problem stems from a recent "Problems and Practices" on sidewalks.

* * * *

The "best method of sidewalk construction" in the Jan., 1954, ACI JOURNAL* brings up a question: should wire mesh be placed in walks (and in basement slabs on grade)? Many architects and engineers habitually put mesh in at the slightest excuse.

What is the purpose of mesh so used? Two commonly cited reasons are for shrinkage cracks and to bridge soft spots in the subgrade.

The writer's suggestion is that when walks or slabs on grade are divided into 3 x 3-ft or 4 x 4-ft squares with occasional expansion joints, mesh for shrinkage cracks is unnecessary.

For bridging soft spots, mesh is a poor excuse, for if there are soft spots, the subgrade is unsuitable. The size spot that mesh as reinforcement can bridge easily is small for the usual walks under a heavy wheel load. Mesh will not prevent cracking if there is poor subgrade. The writer saw a gas station recently with heavy mesh in the slabs, and traffic loads had cracked the slab into a worthless mass.

How many have ever watched the various methods of placing mesh? The writer has seen it placed on the ground, and the concrete dumped on top; maybe it was for reinforcing the dirt rather than the concrete. Some workmen will pull it up off the ground after placing some of the concrete; others will put it on top of the fresh concrete and step on it to mash it into place. Sometimes it is blocked up into position. When placing methods and actual final location are so uncertain and erratic, and when reasons for using it are so poorly supported in fact, why is it used?

One purpose served by mesh: it makes it extremely difficult for anyone in the future to cut or remove a small portion of the slab for other repairs. Is this good?

One structural engineer-concrete contractor says that he prefers to use an extra inch of concrete in a walk and leave out the mesh. This seems to the writer the most logical answer. The use of mesh in walks is perhaps best justified on the basis of, "It can't hurt, and you never can tell—."

Will someone please defend the use of mesh? To the cost-conscious engineer, what is your answer? Do you prefer to use mesh in your walks and slabs on grade?

M. W. JACKSON, Structural Engineer, Boulder, Colo.

*"Problems and Practices," *ACI News Letter*, Jan. 1954, p. 13.

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Who's Who This Month

Otto Safir

A "130-ft Span Hangar in Precast Concrete," p. 525, is described by Otto Safir, consulting engineer, Vancouver, B. C., Canada.

After graduation in engineering in 1931, Mr. Safir did postgraduate work in Switzerland on reinforced concrete bridges. Then, until 1945, he worked with consulting engineers and design contractors in England, and from 1945-49 Mr. Safir had his own consulting practice. His main interests have been structural development and he has been responsible for the design of several reinforced concrete bridges.

In 1945 he designed one of the first precast structures in England, a double-bay shed with two 75-ft spans. He was also associated with various precast concrete housing and factory projects in England. Since moving to Canada in 1949 he has engaged in similar work there, notably in British Columbia.

James S. Blackman

James S. Blackman, associate professor of engineering mechanics, University of Nebraska, Lincoln, Neb., tells about "Method for Estimating Water Content of Concrete at the Time of Hardening," p. 533.

Professor Blackman holds a Bachelor of Architecture degree from the University of Nebraska, MS degree from Kansas State College, and a professional degree of Architectural Engineer from the University of Nebraska.

His past experience includes drafting and detailing on bridges for the Nebraska State Department of Roads and Irrigation, and detailing and designing on bridges, hydraulic structures, canals, and power house for the Platte Valley Public Power and Irrigation District. He was also field engineer on structures and housing for the Portland Cement Assn.

In addition to his membership in ACI, Professor Blackman is a member of Sigma Tau, Sigma Xi, ASEE, and the Nebraska Engineering Society. He is a registered professional engineer in Nebraska.

Joseph Penzien and Robert J. Hansen

"Static and Dynamic Elastic Behavior of Reinforced Concrete Beams," p. 545, is presented by Joseph Penzien, assistant professor of civil engineering, University of California, Berkeley, Calif., and Robert J. Hansen, associate professor of structural engineering, Massachusetts Institute of Technology, Cambridge, Mass.

Dr. Penzien, after receiving his BS degree from the University of Washington in 1945 worked as a junior engineer for the Corps of Engineers and later was an instructor at the University of Washington. He entered graduate school at the Massachusetts Institute of Technology in 1947 where he received a DSc degree in 1950. He then joined the staff of Sandia Corp. in Albuquerque, N. M., where he served as a research engineer. In 1952 he accepted a position with Consolidated Vultee Aircraft Corp. as a senior structures engineer before joining the faculty of the University of California in 1953 where he has conducted research on buildings and airplanes subjected to an atomic blast. Dr. Penzien has been an ACI member since 1949.

Dr. Hansen received his BS degree from the University of Washington, Seattle, Wash., in 1940 and during World War II he worked as a research engineer for the National Research Council, National Defense Research Committee, and the Joint Army-Navy Mission on Strategic Bombing, doing research on armor and ordnance problems, passive defense against bombing, and planning of strategic bombing of the enemy. Following the war, he obtained his DSc degree at Massachusetts Institute of Technology and joined the faculty in 1948. Currently he is chairman of research activities in the structures field in the Department of Civil and Sanitary Engineering and has been an ACI member since 1947.

C. S. Hale, R. E. Glover, P. W. Terrell, and W. P. Simmons, Jr.

"Control of Surging in Concrete Pipe Distribution Systems," p. 573, was collabo-

rated on by C. S. Hale, R. E. Glover, P. W. Terrell, and W. P. Simmons, Jr.

C. S. Hale, general manager and chief engineer, Coachella Valley County Water District, Coachella, Calif., was educated at Virginia Polytechnic Institute, Blacksburg, Va., and Henegar's Business College, Salt Lake City, Utah. From 1918-28 Mr. Hale was employed by the Norfolk and Western Railroad, Bluefield, W. Va.; the Utah State Road Commission; the Oregon Short Line Railroad; the Bountiful Irrigation District of Salt Lake City; the Utah Power and Light Co.; and the Los Angeles Gas Co., in California. In 1928 he was employed by the Bureau of Reclamation as instrumentman on hydrographic work in Salt Lake City, thereafter serving successively as chief of survey party, inspector in charge, assistant engineer, assistant chief inspector, resident engineer, construction engineer, superintendent of construction, and division engineer on projects in many different sections of the country. These various locations included King Hill, Idaho; Salt Lake City, Utah; Carlsbad, N. M.; Nyssa and Owyhee Dam, Ore.; Boca Dam, Rye Patch Dam, and Hoover Dam, Nev.; Grand Coulee Dam, Wash.; Escondido, Calif.; and finally Coachella, Calif.

At Coachella he was construction engineer in charge for the Coachella Division of the All-American Canal System from 1945-52. It was during this time that the Coachella Canal, 123 miles in length, was completed. Subsequently the 475 mile underground concrete pipe distribution system was designed and Mr. Hale supervised construction of a major part of these lines.

In November, 1952, he resigned from the Bureau of Reclamation to accept his present position where he supervises operation and maintenance of the system he constructed.

R. E. Glover, research engineer, U. S. Bureau of Reclamation, Denver, Colo., has been associated with the Bureau since 1924. His responsibilities deal largely with design problems requiring a knowledge of mathematics, such as supplying formulas and devising methods for analyzing the structural action of arch dams, conduction problems, etc. Mr. Glover has been an ACI member since 1936.

P. W. Terrell is assistant head, Canals and Pipelines Section, Canals Branch, U. S. Bureau of Reclamation, Denver, Colo.

Mr. Terrell, recipient of a Lone Star Cement Co. Fellowship, 1931-32, received his BS degree in civil engineering in 1931 and MS degree in civil engineering in 1932 from the University of Texas, Austin, Texas.

After graduation he worked as a surveyor and inspector for the Texas Highway Department and as a weigher and plant designer for the Brown and Root Construction Co. Since joining the staff of the U. S. Bureau of Reclamation in 1933, he has worked on the design of canals and canal structures, underground pipelines and distribution systems, and related features. Some of these projects are: All-American canal, Pilot Knob wasteway, Friant-Kern canal and distribution systems (concrete pipe and open laterals), Wellton-Mohawk canal and concrete-lined lateral systems, Coachella Valley concrete pipe distribution system, and flood-control structures and dikes.

W. P. Simmons, Jr., attended the University of Colorado and graduated with a BS degree in mechanical engineering in 1943. From 1943-44 he was employed by Wright Aeronautical Corp. in the experimental laboratory. He worked with the National Advisory Committee for Aeronautics, Cleveland, Ohio, on fluid flow research, 1944-47. He has been employed as a hydraulic engineer in the Hydraulic Laboratory, Bureau of Reclamation, since 1947 and is primarily concerned with flow in closed conduit systems and flow regulating equipment.

Fred E. Koebel

Fred E. Koebel, vice-president and chief engineer, Prestressing, Inc., San Antonio, Texas, presents "Lightweight Prestressed Concrete," p. 585.

During World War II Mr. Koebel served with the U. S. Army Corps of Engineers (1942-46), constructing oil field tanks and pipe lines in the Philippines.

In 1946 he received a BS degree from Rose Polytechnic Institute after which he became an instructor at the School of Civil Engineering, Purdue University. During the period of his instructorship, Mr. Koebe

received an MS degree in civil engineering in 1950, his major study being structures.

In 1951 Mr. Koebel became structural engineer for the Institute of Inventive Research, San Antonio, Texas, where he was engaged in design and development work on the lift-slab method of building construction. Since 1952 he has held his present position with Prestressing, Inc. He is a member of ACI, ASCE, Texas Society of Professional Engineers, and Chi Epsilon.

NMCA holds annual convention

How to keep production at its present level during the predicted slump in building in 1954, with the emphasis on how to increase sales, was the theme of the National Concrete Masonry Assn.'s annual convention held recently in Washington, D. C.

Highlighting the opening session was an address by NCMA's president, Sam Paturzo, of V. Paturzo Bros. & Son, Inc., Baltimore, Md. Other speakers during the conference included Douglas McKay, Secretary of the Interior, Under Secretary of Commerce Walter Williams, Federal Housing Administration Commissioner Guy T. O. Hollyday, and G. Yates Cook, director of housing rehabilitation for the National Assn. of Home Builders.

Election of officers also took place at the annual convention with M. E. Rinker, Rinker Materials Corp., West Palm Beach, Fla., taking office as president of NCMA. New vice-presidents elected to serve for the next year are: R. I. Lampus, R. I. Lampus Co., Springdale, Pa.; W. R. Ireland, Birmingham Slag Co., Birmingham, Ala.; and S. Carl Smithwick, Smithwick Concrete Products, Portland, Ore. Carroll Strohm, Jr., Nashville Breeko Block & Tile Co., Nashville, Tenn., was reelected secretary-treasurer.

Three new directors chosen include: R. H. Radcliff, Jr., Radcliff Gravel Co., Inc., Mobile, Ala.; Jay C. Ehle, Cleveland Builders Supply, Cleveland, Ohio; and E. E. Jensen, Janesville Sand and Gravel Co., Janesville, Wis. Board members reelected to another term include: Harry M. Frank, Atlas Building Products Co., El Paso, Texas; Leon K. Camp, Camp Concrete Products Co., Columbus, Ga.; W. A. Neff, Neff Concrete Products Co., Danville, Ill.; Earl W. Peterson, Ideal Cement Stone Co., Omaha, Neb.; Philip Paolella, Plasticrete Corp., Hamden, Conn.; Herbert J. Vincent, Cinder Block Inc., Detroit, Mich.; and A. R. Waters, Carter-Waters Corp., Kansas City, Mo.

U. S. nonmetallic mineral production sets new high in 1953

Nonmetallic mineral production in the continental United States during 1953 was the greatest in history, according to a year-end summary recently released by Secretary of the Interior Douglas McKay. Although production figures on sand, gravel, and stone are not yet available, production of these commodities probably rose several percent from 1952 to establish a new record high. Production of nonmetallic mineral raw materials used by the construction industry and others was also at an all-time high in 1953, decreases in a few commodities being more than outweighed by all-time highs established by others.

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New Members

The Board of Direction approved 61 Individual applications, 9 Juniors, and 20 Students making a total of 90 new members. Considering losses due to resignations, deaths and nonpayment of dues, the total membership for the month of January is 6401.

Individual

ACUNA, JOSE EDUARDO NINO, Bogota, Colombia (Partner, "Tellez, Reyes Rubiano")

AITKEN, ROBERT B., Stockton, Kan. (Chf. Inspector, USBR)

ALVAREZ, EDUARDO ARNOLD, Santiago, Chile (C. E., Instituto de Investigaciones y Ensayes de Materiales de la Universidad de Chile)

BEIN, JOSEPH A., Beverly Hills, Calif. (Gen. Contr., Public Works)

BEVC, LADISLAV, Napa, Calif. (Struct. Designer, Basalt Rock Co., Inc.)

BOGGESS, BENNETT L., Golden, Colo. (Self-Employed, Concrete Control, Soil Stabilization, Highway Design)

BRANDAO, EURO, Parana, Brazil (Maint. & Mtls. Engr., Comissao Especial de Obras Do Centenario)

BREKKE, GUTTORM N., Washington, D. C. (Sr. Struct. Engr., Washington Aqueduct, Distr. Engr., Corps of Engrs.)

BURKE, ERNEST W., Palmer, Alaska (Concrete Control Engr., USBR)

CAMPBELL, G. A., Montreal, Canada (Engr., Est., Gen., Supv. of Constr., Dir., Pentagon Constr. Co., Ltd.)

CREDLE, E. C., Durham, N. C. (Struct. Engr., Credle Engr. Co.)

CROCKER, WILLIAM D., Dardanelle, Ark. (Project Engr., Little Rock Distr. Corps of Engrs.)

ELFERT, R. J., Denver, Colo. (Matls. Engr., USBR)

FERGUSON, KERMIT D., Arcadia, Calif. (Struct. Designer, Class. Engr., Holmes & Narver, Inc., Los Angeles, Calif.)

FLORIAN, JOSEPH O., JR., New York, N. Y. (Engr., Supv. of Struct. Design, Consolidated Edison Co.)

FONES, SCOTT A., Baxter Springs, Kan. (Self-employed, leasing, loading & sale of crushed stone)

GEZELIUS, CARL V., Canyon Ferry, Montana (Acting Chf. Insp., USBR)

HAMILTON, WILLARD E., San Francisco, Calif. (Engr., Struct. Design, Bechtel Corp.)

HARVEY, LEONARD R., Chester, Mont. (Chf. Insp., USBR)

HOWELL, THOMAS WILLIAM, Escondido, Calif. (Concrete Insp., USBR)

HUBBARD, S. R., Nampa, Idaho (Chf. Engr., Cen-Vi-Ro- Mfg Div., Idaho Concrete Pipe Co.)

KENDRICK, ALLEN W., Raton, N. M. (Engr., Constr., Chf. Insp. Div., USBR)

KONKEL, E. VERNON, Denver, Colo. (Struct. Engr., Ketchum & Konkel, Cons. Engrs.)

KOONS, ROBERT L., Colorado Springs, Colo. (Head, Dept. of Civil Engrg., Colorado College)

KRYZEVICIUS, ST., Toronto, Canada (Prof. C. E., Canadian Brazilian Services Ltd.)

LAMB, T., Calgary, Canada (Gen. Mgr., Structural Engineering Services Ltd.)

LANDIS, MELVIN P., Mulvane, Kan. (Chf. Engr., The Ediger Engineering Co., Wichita, Kan.)

LAVIGNE, ERNEST, Montreal, Canada (Chf. Librarian, Corporation de l'Ecole Polytechnique)

LINCOLN, LEVERNE H., Raton, N. M. (Field Engr., USBR, Vermejo Irrigation Project)

MACDONOUGH, JOSEPH, Syracuse, N. Y. (Vice-Pres. & Chf. Engr., Empire State Prestressed Concrete Inc.)

MAGUIRE, WALTER R., New York, N. Y. (Pres., Walter Maguire Co., Inc.)

MATUSESKI, EDWARD LEO, Ames, Iowa (Concrete Constr.)

MAYO, CLAUDE E., Mountain Home, Ark. (Constr. Supt., Little Rock Distr., Corps of Engrs.)

MULKEY, WENDELL T., Palisades, Idaho (Chf. Concrete Branch, Palisades Project, USBR)

MULLER, FRED A., Richmond Hill, N. Y. (C. E., Universal Atlas Cement Co.)

NICHOLS, GLENN E., Pampa, Texas (Engr., Cantrell & Co., Architects)

NIELSEN, JOHN H., Racine, Wis. (Struct. Designer, Chas. S. Whitney, Cons. Engr.)

NIZENKOFF, CONSTANTIN C., Chicago, Ill. (Asst. Mgr., of Struct. Dept., Freyn Engrg. Dept. of Koppers Co.)

OSBORN, LEWIS K., Los Angeles, Calif. (Chf. Struct. Engr., Kistner, Wright & Wright, Archs. & Engrs.)

PANKOW, CHARLES J., Arcadia, Calif. (Building Constr., Supv., Design, Peter Kiewit Sons Co.)

PECK, ROBERT T., East Cleveland, Ohio (Asst. Mgr., Ready Mix Sales Dept., Master Bldrs. Co.)

RITOTA, DANTE, East Orange, N. J. (Vice-Pres., The Gulick-Henderson Laboratories, Inc.)

RIVERA, MIGUEL ANGEL, Honduras, C. A. (Constr. Engr., Constructor a Sula)

RODRIQUEZ, ROBERTO VIEANNA, Espirito Santo, Brazil (Engr., Head of Espirito Santo Distr., Supv., Design & Constr., Dept. Nacional de Obres de Saneamento, Rio de Janeiro, Brazil)

ROSE, HARRY D., Moline, Ill. (Struct. Engr., Design, Corps of Engrs., Clock Tower, Rock Island Distr.)

SAINT, IGNACIO, Mexico City, Mexico (Soil Mechanics and Struct. Engr.)

SHEFFNER, ZORAH E., Los Angeles, Calif. (Chf. Struct. Designer, Industrial & Gov't Projects Div., The Fluor Corp.)

SILBERSTEIN, RICHARD F., Fresno, Calif. (Res. Associate—Struct. Engr., Arthur A. Sauer, Sacramento, Calif.)

SKIPPER, VIRGIL D., Atlanta, Ga. (Mgr., Concrete Dept., MacDougald-Warren, Inc.)

SMITH, P. C., West Palm Beach, Fla. (Gen. Supt. of Branch Corporations, Rinker Materials Corp.)

SOOT, ERVIN A., Portland, Ore. (Head of Struct. Dept., Stevens & Thompson Engrs.)

STUBBS, ALLAN H., Los Angeles, Calif. (Mgr. of Prestressed Concrete Dept., C. D. Wailes Corp., Sun Valley, Calif.)

VAL, ALBERTO, Iowa City, Iowa (U. T. E., Montevideo, Uraguay)

VIESER, ELLIS S., East Orange, N. J. (Vice-Pres., The Gulick-Henderson Laboratories)

WHITE, KEN R., Denver, Colo. (Cons. Engr., Civil & Structural)

WILLETT, EUGENE P. H., Mobile, Ala. (Concrete Engr., in charge of Concrete Inspection, Testing, Dixie Laboratories)

WILLIAMS, HOWARD JAMES, Boston, Mass. (Partner, Fay, Spofford & Thorndike, Civil Engrs.)

WINELAND, JEFF A., Sacramento, Calif. (Design Engr., USBR)

WOLCHUCK, ROMAN, Kew Gardens, N. Y. (Struct Engr., F. R. Harris, Cons. Engr.)

WYLIE, LENUEL F., Palmer, Alaska (Constr. Engr., USBR, Alaska Dis. Hqrs., Juneau, Alaska)

ZWICK, ABRAHAM, Tivon, Israel (Struct. Engr., Palestine Portland Cement Works "Nesher" Ltd.)

Junior

ABRUZZO, ANTHONY J., Arlington, Va. (Struct. Engr., Preload Engrs., Inc.)

CARTER, JOHN THOMAS, Lewiston, Mont.

HARVEY, B. N., Edinburgh, Scotland (Asst. C. E., J. & A. Leslie & Reid)

HOOVER, HENRY W., JR., Houston, Texas (Struct. Designer, The Fluor Corp, Ltd.)

MASTERSON, M. J., Montreal West, Canada (Supv., Metallicrete Floor Co.)

PAGE, ROBERT W., Beirut, Lebanon (Design, Lab. Work & Teaching, Dept. of Engrg.), American Univ. of Beirut

PAYNE, HOWARD L., Tulelake, Calif. (Asst. Bridge Engr., Res. Engr., constr. projects, Bridge Dept., Div. of Highways, State of Calif.)
PORS, CLEMENT, Casablanca, French Morocco (c/o Corps of Engrs., Engr., Matls., G. S. 9, Chf. of Concrete Matls. Lab.)
TAMARGO, JESUS R., Havana, Cuba (Design, Supv. & Insp., General Concrete Constr. Co. of Cuba)

Student

ARDALAN, MAJID, Teheran, Iran (Univ. of Calif.)
BASOGLA, ADNAN, Berkeley, Calif. (Univ. of Calif.)
CATES, JACK, Wichita Falls, Texas (Univ. of Texas)
DAMAL, EDWARD, Chicago, Ill. (Univ. of Ill.)
EPSTEIN, DONALD C., Charleston, S. C.
HOWARD, W. H., Berkeley, Calif. (Univ. of Calif.)
JIHA, FAIZ, Berkeley, Calif.
LINGER, DON A., Colorado Springs, Colo. (Colo. College)
LOUIE, GORDON C., San Francisco, Calif. (Univ. of Calif.)
MAYERJAK, ROBERT J., Urbana, Ill. (Univ. of Ill.)
MEYER, EZRA A., Berkeley, Calif. (Univ. of Calif.)
MITCHELL, JOHN K., Berkeley, Calif. (Univ. of Calif.)
PRITTEN, LEWIS M., Sacramento, Calif. (Univ. of Calif.)
RENAU, LUIS FERNANDEZ, Iowa City, Ia. (Univ. of Iowa)
TAYLOR, F. W. B., JR., Decatur, Ga. (Ga. Tech.)
VISVESVARAYA, H. C., London, England (Imperial College of Science & Technology, London)
WILSON, EDWARD L., Sacramento, Calif. (Univ. of Calif.)
YANEZ, JOSE ELOY BORDIER, Mexico City, Mexico
YORK, PHILIP J., San Francisco, Calif. (Univ. of Calif.)
ZUNIGA, ROGER A., Berkeley, Calif. (Univ. of Calif.)

Floor panel heating in basementless homes

E. L. Sartain, research associate in mechanical engineering, and W. S. Harris, research professor of mechanical engineering, respectively, at the University of Illinois, Urbana, Ill., described "Heat Flow Characteristics of Hot Water Floor Panels," at the 60th annual meeting of the American Society of Heating and Ventilating Engineers held recently. The authors experimented in the Floor Slab Laboratory at the University of Illinois, and their report consisted mainly of findings on heat exchanges between a panel and its surroundings, and the effectiveness of several methods of insulation.

Four test rooms were used, three exposed only on the north, and one with both north and east exposure. Rooms A and B each had a window with an area equal to 10 percent of the floor area, while rooms C and D had two such windows each. Walls were thoroughly insulated, eliminating heat transfer between adjoining spaces, and floors were separated by 6 in. of cellular glass insulation, extending 4 ft into the ground from floor surface.

Soil under and adjacent to the laboratory contained 3 ft of fill, sloped for proper drainage. To establish heat loss into the ground, thermocouples were buried 20 ft under one test room and thermostats were set to maintain a constant air temperature of 72 F at the 30-in. level. Heat meters and watt-hour meters were installed to check difference between energy input from the heater and heat output of the panel.

Careful checking of the test records showed air temperatures at the center of the rooms were uniform with variations between floor and the 60-in. level of only 0.5 F. Fuel savings resulting from the use of insulation under the entire floor slab as compared to the use of edge insulation only, were proved too small to warrant the difference in cost. Vertical insulation was as effective along the inside edge of the foundation wall as was L-type insulation, with the added advantages of material savings and ease of installation.

Comparisons of reverse loss from heated slabs indicated that fuel consumption using floor panels exceeded that for radiator or convector heating by approximately 10 percent. Floor panel heating, however, had the desirable characteristic of automatically increasing the heat output rate in areas adjacent to points of high heat loss from the room.

Twaits Co. appoints chief estimator

The appointment of Thomas E. Fellows as chief estimator of Ford J. Twaits Co., Los Angeles, Calif., general contractors and engineers, was announced recently by Carl H. Wittenberg, partner and general manager of the firm.

Mr. Fellows is a graduate in civil engineering of Rensselaer Polytechnic Institute, Troy, N. Y. Since graduation his work has been entirely in the construction field, including design, field engineering, and estimating. For the past six years he was associated with H. E. Stoudt & Son, general contractors, as vice-president and chief engineer, and prior to that he was one of several partners engaged in general contracting. In the foreign field, Mr. Fellows has served as highway engineer for Standard Oil Co. of New Jersey in Venezuela, and as assistant project engineer on the construction of the U. S. Naval Base at Trinidad, B. W. I.

Honor Roll

February 1, 1953—January 31, 1954

The final tally of this year's Honor Roll shows J. E. Jellick and James A. McCarthy share first place with 15 credits each. Newlin D. Morgan, Jr., is in third place with 10 credits. F. Thomas Collins, J. R. Florey, and C. H. Scholer share fourth place each having proposed 8 applicants for membership in ACI.

Nine and one-half percent of the total membership have contributed in introducing 674 new members to the many benefits and services derived from affiliation with ACI.

J. E. Jellick	15
James A. McCarthy	15
Newlin D. Morgan, Jr.	10
F. Thomas Collins	8
J. R. Florey	8
C. H. Scholer	8
Robert F. Adams	7
Joaquin Spinel L.	7
Elmo C. Higginson	6½
MacGregor S. Anderson	6
Samuel Hobbs	6
Henry L. Kennedy	6
Shigeo Okubo	6
J. A. Thomen	6
Phil M. Ferguson	5½
Walter H. Price	5½
Herbert J. Gilkey	5
Eugene Mirabelli	5
Carlos D. Bullock	4
W. S. Cottingham	4
K. A. Howard	4
William McGuire	4
Jose Luis Montiel G.	4
Lawrence L. Schwinn	4
M. A. Sozen	4
H. B. Tryhorn	4
Somthob Dhanuckamin	3
W. C. Hansen	3
Myle J. Holley, Jr.	3
Charles H. Hoopes	3
J. B. Jacobsen	3
T. C. Kavanagh	3
J. W. Kelly	3
Hendric Lauga	3
W. R. Lorman	3
Eric C. Molke	3
William G. Murphy	3
E. R. Needles	3
Kiyoshi Okada	3
J. W. Reece	3
Fred F. Van Atta	3
Igor V. Voshinin	3
George D. Youngclaus	3
C. C. Zollman	3
Bernard S. Harder	2½
T. Y. Lin	2½
Platon T. Mikluchin	2½
B. R. Wood	2½
Arbak A. Abdalian	2
Harold Anson	2
Hugh Barnes	2
Reinard W. Brandley	2
Earl I. Brown	2
V. J. Cespedes	2
Edward M. Corbett	2
M. A. Craven	2
Hugh Doyle	2
A. D. Engle	2
Eugene Fallon	2
Benjamin P. Felix	2
Ambrosio R. Flores	2
E. M. Freeman	2
John Gilliland, Jr.	2
Roberto E. Guzman Herrera	2
K. Hajnal-Konyi	2
John M. Hayes	2
J. B. Herbish	2
Chuzo Itakura	2
R. F. Jones	2
Charles F. Jost	2
M. B. Klock	2
Masatane Kokubu	2
Federico Leon	2
Gerardo Linares	2
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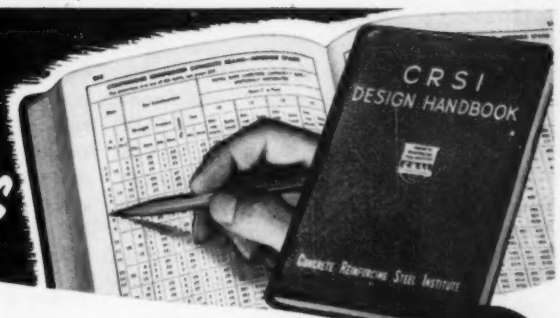
Continued on p. 29

HOW TO DESIGN A REINFORCED CONCRETE MEMBER IN 30 SECONDS



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Prepared by The Committee on Engineering Practice

CONCRETE REINFORCING STEEL INSTITUTE

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NCA elects new officers for 1954

John F. O'Connell, vice-president, Bechtel Corp., San Francisco and New York, was elected president of the National Constructors Assn., at the association's annual meeting held recently, and J. H. Sharpe, construction manager, Arthur G. McKee & Co., Cleveland, Ohio, was elected vice-president of the organization.

Other members of the executive committee included E. R. McGonnigle, M. W. Kellogg Co., New York, N. Y.; C. C. Whittelsey, Ford, Bacon & Davis Construction Corp., Monroe, La.; T. C. Williams, Stone & Webster Engineering Corp., Boston, Mass.; W. R. Wood, Girdler Co., Louisville, Ky.; and L. C. Reynolds, C. F. Braun & Co., Alhambra, Calif.

Other chairmen elected for 1954 were P. S. Klick, Jr., Foster Wheeler Corp., New York, N. Y.; B. O. Yeldell, Ford, Bacon & Davis Construction Corp., Monroe, La.; F. R. Stevens, Stone & Webster Engineering Corp., Boston, Mass.; J. J. Kelly, M. W. Kellogg Co., New York, N. Y.; H. B. Christman, Fluor Corp., Ltd., Los Angeles, Calif.; and E. D. Hoekstra, H. K. Ferguson Co., Inc., Cleveland, Ohio.

ASEE announces 62nd meeting

The American Society for Engineering Education will hold its 62nd annual meeting June 14-18, with the University of Illinois as host institution. Dr. Lloyd Morey, the university's acting president, will open the general session June 15, at which the main speaker will be the ASEE national president, Dean Linton E. Grinter of the University of Florida.

Stressing the evaluation of engineering education and its prospective functions during the next two decades, the meeting will take up such matters as improvement of teaching, recognition of good teaching, accreditation of engineering colleges, professional status of engineers, and the interrelations of university, industrial, and governmental research. Besides four general sessions and the annual banquet, more than 80 conferences—several of them joint sessions—will be held by ASEE's 17 divisions.

Field Testing of Concrete

Continued from p. 11

the concrete tester. To find specific gravity, 20 lb of surface-dry aggregate P was placed in the tester which had previously been half-filled with water. Water was then added to overflowing and the transparent plastic plate slid over the top. The contents of the container then weighed $22.05 + P'$ or 22.05 lb more than the weight of material under water. Specific gravity was then obtained from

$$S = \frac{P}{P - P'}$$

Surface moisture of the aggregate was determined in the same manner except that moist, instead of surface-dry aggregate was used. P lb aggregate with w percent moisture weighed submerged

$$P_w' = P' - \frac{P'w}{100}$$

and the percent moisture by weight of moist aggregate was

$$w = 100\left(1 - \frac{P'w}{P'}\right)$$

The amount of material finer than the No. 200 sieve was determined using the concrete tester, balance, and the No. 200 sieve. A sample of moist sand, about 11 lb, was placed in the tester, previously half-filled with water, and water added to overflowing. The tester was then leveled off with the plastic plate and the weight of the sample under water determined. Following this, some of the water was poured off and the tester placed on a 4.75-mm sieve which, in turn, was placed over the No. 200 sieve; washing by a stream of water from a hose carried fine particles through the sieves and this was continued till the water ran clear. Filling the tester once more with water, the weight of the sample under water, free of fines, was found. Calculation of percent material finer than the No. 200 sieve was then a simple matter as all necessary data were available.

Testing of cement

Specific gravity of cement was obtained by immersion in a neutral fluid since cement reacts with water; however, consideration must be given to the fact that in a cement-water reaction, the absolute volume of the cement paste becomes less than the sum of the absolute volumes of water and cement. To ascertain the extent of this it was necessary to assume an apparent higher specific gravity for the cement, which the author called the "calculated gravity." Tests showed the magnitude of this to be uncertain and dependent on many factors. For the Norwegian cement used, an assumed calculated gravity of 3.20 was used, whereas by standard tests the specific gravity was 3.135.

Testing of fresh concrete

Consistency of fresh concrete can be determined in the concrete tester, but for exceedingly dry mixes the drop table must be used. In using the tester, the slump cone was securely fastened in the container, by means of the handle, and filled with concrete in three lifts, each rodded 25 times. The cone was then carefully lifted and if the concrete was not in contact with the sides of the container (slump less than 4 in.), the slump could be measured from the midpoint of the handle. Cleats under the container were pressed into a wood platform and the concrete was remolded by allowing the handle to fall freely against the sides of the container, alternately on each side. The number of blows necessary to remold the slump cone so that the periphery of the mix coincided with the 1.32 gal. (5 liter) mark on the inside of the cylinder was taken as a measure of the workability of the concrete. (The cone volume equals 1.45 gal.)

If the mix was exceedingly dry, the concrete in the cone was further compacted by amplified impulses using the drop table in conjunction with the concrete tester. The container and the cone were both fastened to the drop table and secured by means of a ring (Fig. 3). Three lifts, rodded 25 times each, were used to fill the cone and collar. Concrete was compacted by turning the handle of the drop table 15 times, at the rate of 1½–2 revolutions per sec. Collar and excess concrete were then removed and the slump cone lifted out. The number of revolutions necessary to bring the concrete to the half-way mark on the container was recorded and used as an indication of the consistency of the concrete.

Unit weight and air content of fresh concrete were determined as a direct continuation of the consistency measurements. Weight

of concrete in the container P_b was first determined and then water was poured into the container until it overflowed using the plastic plate to facilitate pouring. The plate was then slid over the top of the container, and the weight of concrete, with air, under water P_b' determined. Concrete volume, in the metric system, was $P_b - P_b'$ and its unit weight (kg per cu m)

$$R_b = 1000 \frac{P_b}{P_b - P_b'}$$

To find the air content, about ½ gal. of water was poured off and entrapped air in the concrete was removed by vigorous stirring for at least 2 min. Water was added, the scum on the surface removed, and the weight under water of air-free concrete P_{bo}' determined. Air in the concrete having been replaced with water resulted in a weight difference of $P_{bo}' - P_b'$. Percent air in the concrete was then

$$L = 100 \frac{P_{bo}' - P_b'}{P_b - P_b'}$$

When the surface scum was removed, some of the fine particles were lost. Tests have shown that this loss is insignificant for ordinary concrete, whereas for air-entrained concrete P_{bo}' must be corrected. However, it has been found that if water is sprayed as a shower over the entire surface of the scum, no correction for air-entrained concrete is needed. Tests have shown that the loss of the fine particles is insignificant.

Composition of fresh concrete

The composition of the fresh concrete can be determined in four ways.

1. *Method of absolute volumes*—In the metric system

$$\frac{C}{S_c} + \frac{mC}{S_s} + \frac{nC}{S_{st}} + \frac{V}{1.0} = 1000 - L$$

where C = weight cement
m = sand-cement ratio
n = coarse aggregate-cement ratio
V = weight water
L = air content
S_c = calculated gravity of cement
S_s = specific gravity of sand
S_{st} = specific gravity of coarse aggregate

2. *Method by weight*—Unit weight of the concrete is expressed as

$$R_b = C + mC + nC + V$$

with the notation as given previously. Unit weight of the concrete is determined in the concrete tester, assuming the proportioning by weight (1:m:n) and water-cement ratio (W/C) are known, for example

Proportions by weight (1:m:n) = 1:2.75:2.75
Water-cement ratio (W/C) = 0.6
Unit weight of concrete, R_b = 3910 lb per cu yd

$$\text{Cement content, } C = \frac{R_b}{1 + m + n + \text{W/C}}$$

$$= \frac{3910}{7.1} = 550 \text{ lb per cu yd}$$

3. *Method by weight under water*—With this method it is possible to check the W/C ratio without knowing the amount of water added. This method utilizes the known weight of air-free concrete under water as determined with the concrete tester (P_{bo}'), which, obviously, must equal the sum of the weights of the component materials under water.

$$P_{bo}' = \mu_c P_c + \mu_s m P_c + \mu_{st} n P_c$$

where P_{bo}' = weight of air-free concrete under water
$\mu_c P_c$ = weight cement under water
$\mu_s m P_c$ = weight sand under water
$\mu_{st} n P_c$ = weight gravel under water

and μ_c, μ_s, and μ_{st} are immersion ratios for cement, sand, and gravel, respectively, and may be found from

$$\mu = \frac{P'}{P} = \frac{S - 1}{S}$$

with P the weight in air, P' the weight under water, and S the specific gravity.

From this the weight of cement P_c may be solved for

$$P_c = \frac{P_{bo}'}{\mu_c + \mu_s m + \mu_{st} n}$$

and it is further known that the water content of the sample P_v is

$$P_v = P_b - P_c (1 + m + n)$$

where P_b = weight of the concrete. The water-cement ratio P_v/P_c is then

$$\frac{\text{W}}{\text{C}} = \frac{P_v}{P_c} = \frac{P_b}{P_{bo}'} (\mu_c + \mu_s m + \mu_{st} n) - (1 + m + n)$$

4. *Washing method*—If the proportions of the mix are unknown, the composition of the mix can be determined by first obtaining the

weight of air-free concrete under water P_{bo}', washing out the cement by sieving the concrete through 0.15- and 4.75-mm screens, and then weighing under water the amounts retained on these sieves. Weight of the cement under water $\mu_c P_c$ is then equal to the difference between the weight of the air-free concrete under water P_{bo}' and the weight of the aggregate under water $(\mu_s m P_c + \mu_{si} n P_c)$. On this basis the W/C ratio can be computed, but compared to the weight-under-water method the washing method is cumbersome and used only in extraordinary cases.

Rust Engineering Co. builds for AEC

The project of anchoring a hollow steel sphere that stands five stories higher than Niagara Falls, and readying it to house an atomic submarine reactor is being completed by Rust Engineering Co., Pittsburgh, Pa., for the Atomic Energy Commission, near West Milton, N. Y. Somewhat like an egg in an egg cup, the giant 225-ft sphere is designed to nestle on its foundation about 38 ft below ground level. Inside, it was filled to slightly above ground level to provide floor space, ballast, and foundation support for the landlocked prototype of the Submarine Intermediate Reactor (SIR) for the Navy's *Sea Wolf*.

Originally the 3850-ton steel sphere "floated" about 4 ft above its concrete saucer foundation, being supported at its equator by a ring of 26 steel columns. Filled, its weight is distributed between the foundation and the columns. The huge ball was suspended above its bed to allow working space beneath, since each weld had to be x-rayed and given a final leak test under air pressure.

The problem faced by Rust engineers was placing a 3900 cu yd cushion of concrete beneath the hollow ball and 28,000 tons of limestone fill inside it without setting up localized stresses that might break the 1-in. skin or distort the shape. To accomplish this, crushed limestone was spread inside and concrete placed outside the sphere on alternate days in 3-ft layers. In no case was either material permitted to rise more than 18 in. above the level of the other, and gages were used in a constant check on sphere stresses throughout the two-fold operation which required about one month. A chute, revolving around the globe's axis like the hands of a clock, was devised to place concrete in building up the foundation, which has a diameter of 179 ft at ground level.

The project inside the globe could be likened to building a ship model in a bottle, for all fill and structural material was brought in through a single opening which later will be sealed and entry will be effected through two airlock entrances. Limestone fill inside the globe, composed of crushed screenings 1 in. and under, was compacted to a relative density of 95 percent, and at floor level covered a 22,200-sq ft area. A concrete floor 3 ft thick under the nuclear reactor will complete the project.

Turner Construction Co., anticipates keen competition

H. C. Turner, Jr., president of Turner Construction Co., New York, N. Y., announced at the annual stockholders' meeting that the volume of construction work performed by Turner in 1953 exceeded $100,000,000 for the third consecutive year.

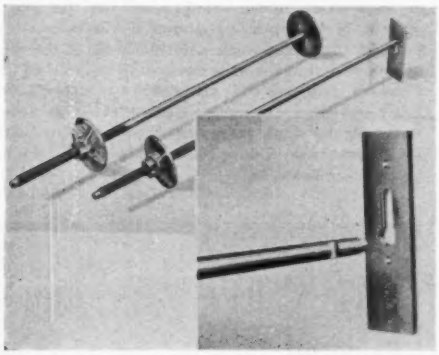
Mr. Turner commented: "The volume of construction work throughout the country has shown only a small decline, competition has become extremely sharp, and we believe that it will be difficult to secure competitive contracts at a reasonable profit. In fact, it is not unlikely that we shall see during the next few years a large increase in business failures in the construction industry as the financially weak and less experienced contractors fall by the wayside because of unprofitable operations. This could well reduce the volume of earnings to all contractors for a while.

"Construction costs showed little change during the year and we anticipate a further period of cost stability in 1954. We believe the outlook is favorable for industry and business in general to undertake new construction work.

"We have started 1954 with a large volume of work on our books and we hope and believe that we will be able to secure a reasonable share of the work in prospect and thus maintain the volume of recent years."

Tools, Materials, Services

Under this heading note will be made from time to time of producer literature of presumed technical interest (and available from its source for the asking) to ACI users of tools, equipment, materials, accessories, and special services.



Concrete form clamp

Taper Tye form clamps, made by H. J. Krueper Co., feature a tapered rod which enables rods to be quickly driven from the concrete, requiring only a light tap with a jack hammer. Formerly threaded on both ends for attaching washers, a new type has now been introduced which utilizes a fast-assembling keyplate on the small end instead of a threaded washer. The rod is slotted on opposing sides of the small end and the keyplate is equipped with an inverted keyhole which slides over the rod and drops into the slots, locking the units in place. Tapered edges of the keyhole prevent binding in the slots upon removal.

Type A, with washers, is adjustable for 6 to 14-in. concrete and may be used in conjunction with shebolts for even greater extensions. Type B employing the new keyplate type is adjustable for 6 to 13-in. concrete. Both models can be furnished with rods up to 61 in. long upon special order.—H. J. Krueper Co., 535 S. Clarence St., Los Angeles 33, Calif.

Fire resistance ratings

The National Board of Fire Underwriters has published a 48-page pamphlet of fire resistance ratings which is a revision of Appendix A of its National Building Code. The pamphlet is of interest to architects and building engineers, as well as public officials interested in fire safety in buildings, and, in addition, the National Board says, it is of value for use in connection with other building codes in force in any community.

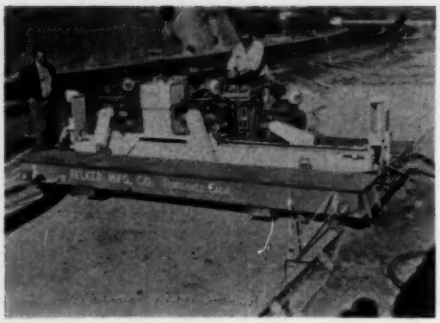
A number of tables on fire resistance ratings of beam, girder, and truss protections; ceiling constructions; column protections; floor and ceiling constructions; roof constructions; and walls and partitions are included.—National Board of Fire Underwriters, 85 John St., New York 38, N Y. If residing in the Middle West, write to 222 West Adams Street, Chicago 6, Ill., and if west of the Rockies, to 465 California St., San Francisco 4, Calif.

Vermiculite walls

A new building material made of vermiculite, slag, oil, and water has been developed by a Flint, Mich., firm for exterior residence walls and office and factory partitions. Called Modern-Crete, the material is supplied in 16 x 8-ft panels in various thicknesses and forms and though it weighs half as much as concrete, it will carry 25 tons at costs comparable to that of other building materials. Time-saving is the material's big advantage, for example, two houses, each with a 26 x 36-ft base, were erected in 8 hr (4 hr each), ready for the roof.—Zonolite Co., 135 S. LaSalle St., Chicago, Ill.

Power float

An improved Kelley compactor power float has been announced by Kelley Machine Division, Wiesner-Rapp Co., which features a vertical power head to provide power through special alloy steel gearing for rotation of the heavy float disc, and four cast-steel hammers pivoted on shafts attached to the body of the machine. The heads of these hammers ride on a cam track on the balanced float disc and as the disc rotates, the four hammers are raised and dropped. The heavy, rapid impact of the compacting hammers on the rotating disc compacts, densifies, and floats the slab to a smooth level surface for proper finishing.—Kelley Machine Division, Wiesner-Rapp Co., Inc., 1600 Seneca St., Buffalo 10, N. Y.



Highway contraction joint sawing

First tests of a new production-type contraction-joint cutter produced by Felker Manufacturing Co. for concrete pavements were completed recently on the Torrey Pines State Highway widening project near San Diego, Calif. The new Di-Met machine, not yet named, has been specially developed for mechanizing contraction-joint sawing and saving time on the job. Measuring 14 ft 6 in. across with an 8 ft depth, the machine is equipped with ball-bearing wheels and rubber tires and is so designed that it can ride either the header boards of the new slab or ride one side on the headers, the other on a parallel existing slab, and, conditions permitting, it can also roll directly on the green slab.

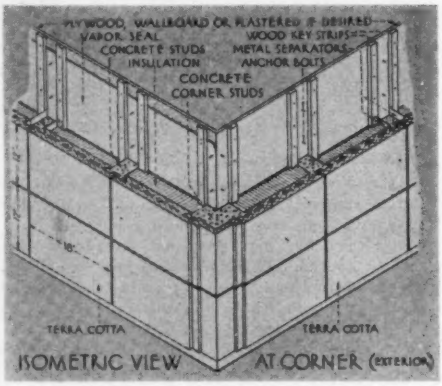
An H-beam serves as a track across the slab and supports a traversing carriage upon which are mounted two (or more) heavy duty spindles. Operation of the carriage is reversible, sawing being performed in either direction. The spindles operate simultaneously, each carrying a Di-Met concrete blade which is lowered into the concrete and takes a 6-ft traverse cut, and, being aligned, join up in the center of the slab, producing a 12 ft long contraction joint. Two 12-in. segmented-type diamond concrete blades are used on this particular unit to make the 2 in. depth of cut. Variable depths from 0 to 6 in. can be obtained using different diameter blades for sawing contraction joints in airport runways and other similar projects. A 6 in. depth of cut can be made with an 18-in. diameter blade. Each blade is driven by an independent 26 hp gasoline engine with its own battery and starter. A third engine of equal horsepower and equipment drives a three-stage hydraulic pump, while individual hydraulic motors on the rubber-tired wheels provide power for road travel. Using selector valves, hydraulic fluid is diverted as required to accomplish several functions, *i.e.*, forward and reverse movement, steering, hydraulic lifting and lowering of the track and blades, and transverse travel of the diamond blade carriage.

The manufacturer reports completion of initial tests on the Torrey Pines project showed total cycling time of approximately 3 min per contraction joint, including moving the machine to the next joint location ready for the following cut. This time is subject to variation depending upon aggregate used, sand content, age of concrete, and similar factors. All contraction joints were cut without difficulty—no ragged edges occurred even on the control joint. —Felker Manufacturing Co., 1125 Border St., Torrance, Calif.

Principal stresses measured directly

"Testing Topics," V. 8, No. 4, 1953, published by Baldwin-Lima-Hamilton Corp., contains an article by C. C. Perry entitled "Principal Stresses Measured Directly with SR-4 Strain Gage."

Although it is not commonly realized, the maximum (or minimum) principal stress in a general biaxial field can be measured directly with a single SR-4 strain gage. Basically, the technique involves mounting an ordinary strain gage on the test surface at such an angle to one of the principal axes that the gage is affected by both principal strains in the correct proportion. This proportion is independent of the ratio of principal strains and is determined entirely by the Poisson's ratio of the material. In this manner, single-grid gages can replace either a two-gage rosette or the regular stress gage, and are said to do a better job in the process—Testing Topics, Baldwin-Lima-Hamilton Corp., Philadelphia, Pa.



Vermiculite used for studs and insulation

Vermiculite concrete was used to make concrete studs which interlock with terra cotta face panels in an experimental home built by Northwestern Terra Cotta Corp. To reduce side loads as much as possible, vermiculite was chosen for the new construction technique which also included use of vermiculite loose-fill insulation between the outside face panels and interior wall members.—Zonolite Co., 135 S. LaSalle St., Chicago, Ill.

Portable gravel plant

Pioneer Engineering Works, Inc., has released an 8-page booklet, Bulletin 647, describing their Pioneer 35-S in-line portable gravel plant. The in-line feature of the 35-S (which means that the basic flow of material is in line, longitudinally, with the axis of the plant, the material being fed into the rear and discharged at the front end) is explained along with specifications and details of the unit. The manufacturer states the 35-S is a lightweight, completely portable plant designed especially for those areas where weight restrictions are severe, and where rapid and frequent moves are necessary; it can be pulled in and out of a gravel pit without dismantling or removal of conveyors or other accessories.—Pioneer Engineering Works, Inc., 1515 Central Ave., Minneapolis 13, Minn.

Honor Roll

Continued from p. 22

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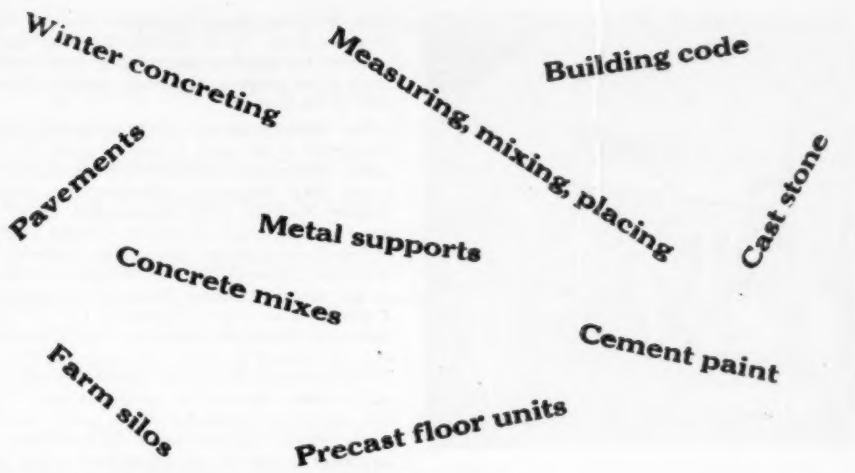

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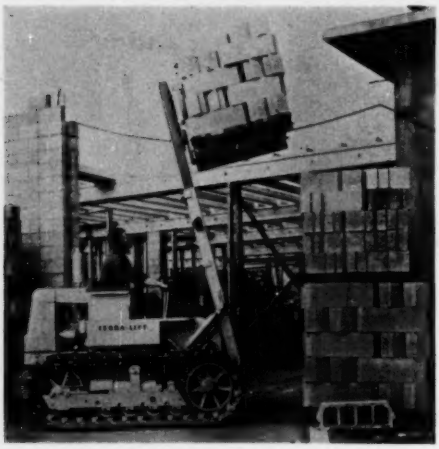


Multi-purpose fork lift

An off-the-road multi-purpose fork lift, the Terra-Lift M3, has been announced recently by American Tractor Corp. The manufacturer claims unusual versatility for this machine which is said to be converted in 10 minutes from a 3000-lb capacity fork lift into a ¾-cu yd bucket loader, 6-ft angling dozer, or towing tractor of 30-drawbar hp. The fork lift is said to handle materials in deep mud, sand or snow, and ice. For indoor and outdoor use, the Terra-Lift equipped with hard rubber shoes is said to operate easily over oil-soaked floors, silicon sand, or steel scraps in mills, foundries, and manufacturing plants.

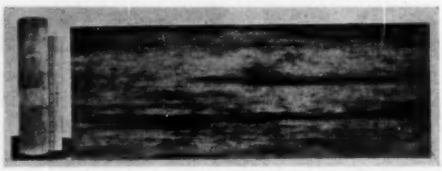
Available with a 9- or 12-ft lifting mast, the unit is capable of handling gravel, sand, pilasters, brick, or concrete block from unpaved work areas to second-story heights.—American Tractor Corp., Churubusco (Fort Wayne), Ind.

Nondestructive testing

Reed Research, Inc., has completed development of an ultrasonic technique, sponsored by the Navy Bureau of Ordnance, for the nondestructive testing of certain nonmetallic solids. Prototype test equipment, incorporating ultrasonic absorption techniques and automatic scanning, has now been built which will produce high contrast records of simulated flaws, or mechanical defects, which were imperceptible in x-ray photographs of the same sample.

In this new system a pair of barium titanate transducers are arranged to transmit and receive acoustic energy (continuous wave transmission at 383 kilocycles per sec) along radii of the cylindrical test sample which is revolved about its longitudinal axis at 100 rpm. Transducers simultaneously traverse the length of the cylinder at a rate of approximately 0.1 in. per revolution of the cylinder, producing a helical scan the full length of the sample. This entire assembly is submersed in water for good acoustic coupling. The scanning mechanism is coupled through gears to a cylindrical recording drum having the same angular velocity as the test sample. Output from the receiver transducer is fed through appropriate electronic circuitry to a tungsten stylus held in contact with electro-sensitive paper (Teledeltos) mounted on the recording drum. As in facsimile recording, the stylus traverses the length of the rotating drum, leaving a trace whose intensity (dot size) corresponds to the level at the receiver.

The resulting record, or Acoustigraph, may be interpreted in the same manner as a positive radiograph which might be obtained by passing an x-ray source along the center perforation of a stationary cylinder wrapped with photographic film. Dark areas in both types of records represent regions of decreased transmission through the material being inspected. However, the Acoustigraph can be obtained at any convenient scale. In the present equipment, a sample 14 in. long is represented by 3 in. on the record, a full revolution by 9 in. The new system is said to combine the major advantages of x-ray and ultrasonic testing methods as identified by the following distinctive features: (a) immediate availability of test results (no processing) in an easily interpreted form (graphic presentation); (b) inherently high sensitivity to internal mechanical flaws (voids, cracks, porous regions, poor bond, and density variations); (c) easily controlled contrast and differential sensitivity in the final record (nonlinear electronic amplification); (d) freedom from high voltage and radiation hazards; and (e) low initial and operating costs (recording paper costs approximately 3 cents per sheet).



Although the present equipment was designed to fulfill a particular need, it is stated that the combination of basic principles employed are applicable to a wide variety of inspection problems. As an illustration, a cylindrical sample of concrete was fabricated and tested with the equipment. The accompanying figure illustrates the concrete sample and resulting Acoustigraph which shows narrow horizontal bands due to layers of sand and wood chips introduced during casting. Other simple geometrics such as rectangular block, flat plates, and thin sheets could be handled by a scanning mechanism employing motions of translation rather than rotation. Where details of the flaw (shape, size, and location) are of secondary interest relative to its presence, the system could be extended to accommodate much more complicated shapes by comparing patterns in the test record with those in a standard record representing a flawless piece. In all nondestructive testing it becomes necessary to establish acceptance-rejection criteria, which are generally based on correlation between some relatively indirect indication of flaws in a group of specimens with the actual operational performance (usually destructive of the same group).

For many problems, the Acoustigraph might provide a cheaper and much more sensitive indication than x-rays; furthermore, it will provide a permanent record in a form which is easily interpreted and correlated.—Reed Research, Inc., 1048 Potomac St., N. W., Washington, D. C.

Membership in the American Concrete Institute

To facilitate prospective members in joining the Institute, membership application forms are provided. Present Members may aid by bringing these forms to the attention of those who may profit from membership advantages. The grades of membership are described overleaf.

All who have an interest in concrete and a desire to improve it through a nonprofit educational service in gathering, correlating, and disseminating information on design, construction, manufacture, use, and maintenance of concrete structures and products are eligible for Institute membership.

There are many opportunities in the Institute for technical committee activity, contributions from your experience in technical papers and the briefer "Letters from Readers" section, and in reviewing technical literature. Thus you can help further ACI's aim "to provide a comradeship in finding the best ways to do concrete work of all kinds and in spreading that knowledge," and at the same time benefit from the experiences of other Members.

(cut here)

Board of Direction, American Concrete Institute
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Date_____

Individual Members, North America and U. S. Possessions	**$15.00**
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Of the annual dues, $12.00 is for the JOURNAL of the American Concrete Institute (except that dues for Junior and Student Members apply in full for the JOURNAL).

The undersigned hereby applies for_____**membership**
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in the American Concrete Institute. Proposed by_____

For Corporation Membership, ACI representative will be_____

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(Date of graduation if Student) (Name, if Corporation)

Signature_____

For our records, please complete both sides of application.

EXCERPTS FROM BYLAWS: ARTICLE I—MEMBERS

Section 1. This Institute shall consist of Members, Corporation Members, Contributing Members, Junior Members, Student Members and Honorary Members interested in furthering the Institute's objects as set forth in its Charter.

Sec. 2. A Member shall be an individual.

A Corporation Member shall be a firm, corporation, society, agency of government or other organization. A Corporation Member shall name one individual as its representative who will enjoy all membership rights and privileges.

A Contributing Member shall be an individual, firm, corporation, society, agency of government or other organization wishing to give larger support to Institute activities through the payment of larger dues. Contributing Members, other than individuals, shall name representatives as do Corporation Members.

A Junior Member shall be a person less than 28 years old.

A Student Member shall be less than 28 years old and a student in residence at a recognized technical or engineering school.

An Honorary Member shall be a person of eminence in the field of the Institute's interest, or one who has performed extraordinarily meritorious service to the Institute.

Sec. 3. All classes of Members except Honorary Members and Student Members, shall be proposed by at least one Member of the Institute and elected by a two-thirds vote of the Board of Direction. An Honorary Member shall be elected by unanimous vote of the Board of Direction. A Student Member shall be proposed by a member of his school's faculty, who need not be a Member of the Institute, and elected by a two-thirds vote of the Board of Direction.

Sec. 4. All Members shall have all rights and privileges of membership as determined by the Board of Direction except that a Junior or Student Member shall not vote nor hold office. The status of a Student Member shall change automatically to that of Junior Member on the first anniversay of his membership succeeding the date on which he ceases to be a student in residence. The status of a Junior Member shall be changed to that of Member on the first anniversary of his membership after he becomes 28 years of age.

Sec. 5. Applications for and resignations from Membership and requests for change of representatives of Corporation or Contributing Memberships shall be presented in writing to the Secretary-Treasurer. Resignations may be accepted only from Members whose dues are not more than 60 days in arrears, except by special action of the Board of Direction.

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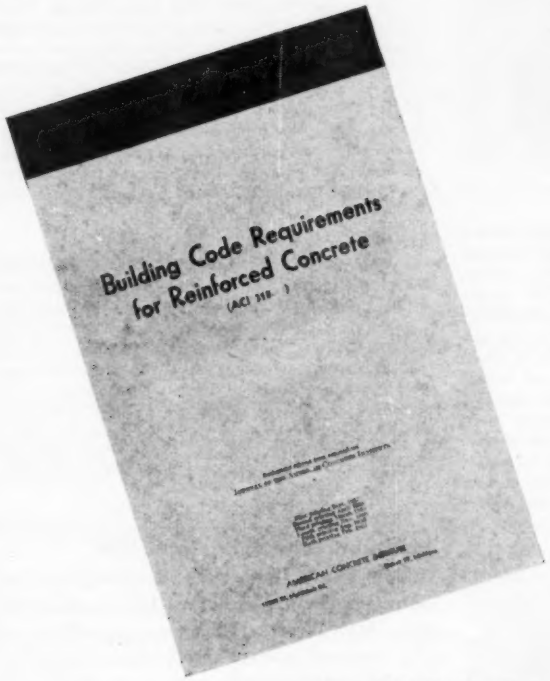

Is your local code up-to-date?

The ACI Code allows for properties of A305 bars
RESULT—steel savings in reinforced concrete construction

The Code covers the proper design and construction of buildings of reinforced concrete. It is written in such a form that it may be incorporated verbatim or adopted by reference in a general building code.

Changes in the ACI Code decrease the allowable bond stress in plain bars (including old-type deformed bars) and increase allowable bond stresses for new-type bars. According to the new provisions, all plain bars must be hooked, but the new reinforcing bars develop sufficient anchorage by bond to correspond to special anchorage under the old Code. The ACI Code was revised to give designer and builder the benefit of improved bond stresses of new bars, with its ensuing economy.

The Code also covers: mixing, placing, curing and cold weather protection of concrete; forms; cleaning, bending, placing, splicing and protection of reinforcement; construction joints; general design considerations; flexural computations; shear and diagonal tension; bond and anchorage; allowable stresses; flat slabs; columns and walls; and footings.

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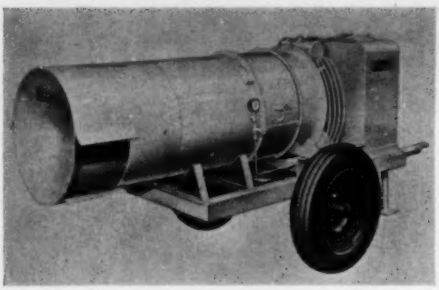
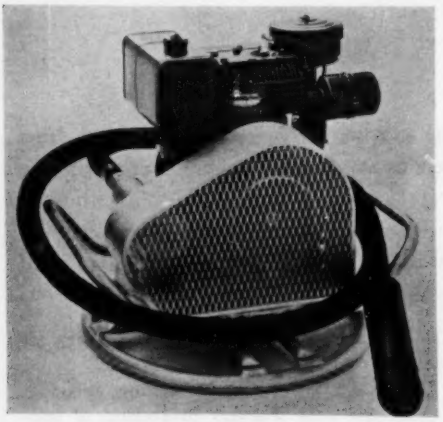


Mobile heater

Besler Corp. announces a new, large mobile heater, the Bes-D-Frostr, for drying and curing concrete units or outside elements such as highways, concrete ditches, culverts, and foundation work. One of the outstanding features, according to the manufacturer, is its ability to heat large areas completely and uniformly. A blower-type heater with axial fan, powered by gasoline engine or electric motor, the unit is said to heat rapidly and distributes warm air in a controlled pattern without creating isolated "hot spots." In addition the heater is said to light instantly, require no preheating, and can be used in close quarters because the flame is shielded. It is capable of producing 1 to 4 million Btu per hr on low cost fuel.—Besler Corp., Oakland, Calif.



Circular base vibrator

To provide maximum compactness and lightest weight for a full-powered gas engine driven vibrator, Viber Co. offers its standard gas unit with a strong, lightweight circular pedestal base. The rigid, lightweight, large diameter circular base unit, Model GC, is said to save 14 lb in weight and 10 in. in over-all length as compared to the standard two-wheel carriage mounting.

The base is made of welded standard 1-in. pipe, with cross members supporting two sealed ball bearings to carry the swivel plate on which the vibrator engine and takeoff shaft are mounted, permitting the entire upper assembly to rotate freely through 360 degrees. Open construction of the base is said to prevent accumulation of concrete or dirt in the field, and it also provides a larger diameter (24 in.) base without the weight of solid plate or castings, making for better stability and lighter weight.

Use of the standard swivel plate permits interchangeability of the circular pedestal base with Viber's standard two wheel carriage mounting by the addition of two lifting handles welded on the swivel plate. Conversion of carriage mounted units in the field is accomplished by removing the nut from the through bolt which holds the swivel plate on the two-wheel carriage, and transferring the complete assembly, including swivel plate, to the pedestal base. —Viber Co., 726 South Flower St., Burbank, Calif.

Insulation

A 24-page catalog, "Foamglas—the Long-Life, Stay-Dry Insulation, for Industrial, Commercial, and Public Buildings," has been released by Pittsburgh Corning Corp., and includes lists of condensed specifications for the application of Foamglas in walls, ceilings, floors, roofs, perimeters, and in low temperature space insulation. Complete information on all accessory materials is also listed, along with physical properties, characteristics, and performance data of this cellular glass insulation material.—Pittsburgh Corning Corp., One Gateway Center, Pittsburgh 22, Pa.

Industrial construction for 1954

Industrial and process plant construction during 1954 will continue at substantially the same high level as 1953's record, officers of the National Constructors Assn. predicted at the organization's annual meeting held recently in New York.

Little doubt exists that the outlook for plant construction during the coming year is optimistic, said John J. O'Donnell, retiring president. The current high level of employment in the industry is a strong indication for a high level of industrial and process plant construction activity in 1954. While some types of construction have tapered off from the high marks in 1953, other types of construction—such as petro-chemical and power plants—will keep the over-all level of heavy industrial construction as high as the previous year.

Association leaders believed that in light of the more competitive conditions in industry in general, engineering construction companies and their clients will continue to emphasize their joint efforts to stabilize construction costs. There already are some indications that 1954's industrial plants will be as simple and unadorned as possible—consistent with long life and efficient operating conditions.

DISCUSSION

Discussion closed January 1, 1954

Sept. Jl. '53

Minimum Standard Requirements for Precast Concrete Floor Units—Committee 711

Concrete for Radiation Shielding—Edwin J. Callan

Absorption by Concrete of X-Rays and Gamma Rays—B. E. Foster

Effect of Sustained Overload on the Strength and Plastic Flow of Reinforced Concrete Beams—G. W. Washa and P. G. Fluck

Economical Design of Prestressed Concrete Beams—David P. Billington

Discussion closed February 1, 1954

Oct. Jl. '53

Proposed Recommended Practice for Selecting Proportions for Concrete—Committee 613

Development of a Cell for the Installation of Electrical Resistance Strain Gages—Herbert E. Worley and Richard C. Meyer

Failure of Concrete under Combined Tensile and Compressive Stresses—Gerald M. Smith

Correlation Between Laboratory Accelerated Freezing and Thawing and Weathering at Treat Island, Maine—Thomas B. Kennedy and Katharine Mather

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Nov. Jl. '53

Shearing Strength of Reinforced Concrete Column Footings—Eivind Hognestad

Selection and Design of Prestressed Concrete Beam Sections—T. Y. Lin and A. C. Scordelis

Relation of Shrinkage to Moisture Content in Concrete Block—George L. Kalousek, Richard J. O'Heir, Kenneth L. Zeims, and Edwin L. Saxer

Torsional Rigidity of Rectangular Slabs—Kurt H. Gerstle and Ray W. Clough

Determination of Setting and Hardening Time of High-Alumina Cements by Electrical Resistance Techniques—J. Calleja

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Pier 57 Concreted Through the Winter—M. D. Morris

Factors Influencing the Strength of Concrete as Revealed by a Six-Year Record of Concrete Control—J. J. Waddell

Limit Analysis and Design—William Prager

Floor Aggregates—E. W. Scripture, Jr., S. W. Benedict, and D. E. Bryant

Validity of Certain Assumptions in the Mechanics of Prestressed Concrete—Grover L. Rogers

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Effect of Age of Concrete on Its Resistance to Scaling Caused by Using Calcium Chloride for Ice Removal—W. C. Hansen

Corrugated Box Forms for Concrete Ribbed-Slab Construction—H. C. Pfannkuche

Strap Steel for Prestressed Concrete Structures—K. P. Milbradt

Studies on the Cementitious Phases of Autoclaved Concrete Products Made of Different Raw Materials—George L. Kalousek

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